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Chemistry Department

Faculty of Science- Cairo University

Final Exam for Chem. 101

Summer Course

September 2011

Time allowed: 2 hrs.

Answer *five* questions only from these questions

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Chem 101
2011

Q1: Complete each of the following **(12 Marks)**

1- The orientation of the orbital depends on the value of ----------,----------
---------quantum number.

2- The energy and the size of the level depends on ----------
---------- quantum number.

3- The ionization energy defined as:----------

4- Hund's rule state that----------

5- De Broglie equation is:----------

6- Valence electrons are :----------

7- The order of the ionization energy of F, C, N, Li, Be, O, B is ----------
---

8- For $4d^1$ electron , n= ----------, l=----------,
ml=----------

9- Lewis symbol of an element is ----------

10- Pauli Exclusion principle is :----------

11- The order of electron affinity of I, Cl, F, Br is ----------
---

12- Electronegativity is :----------

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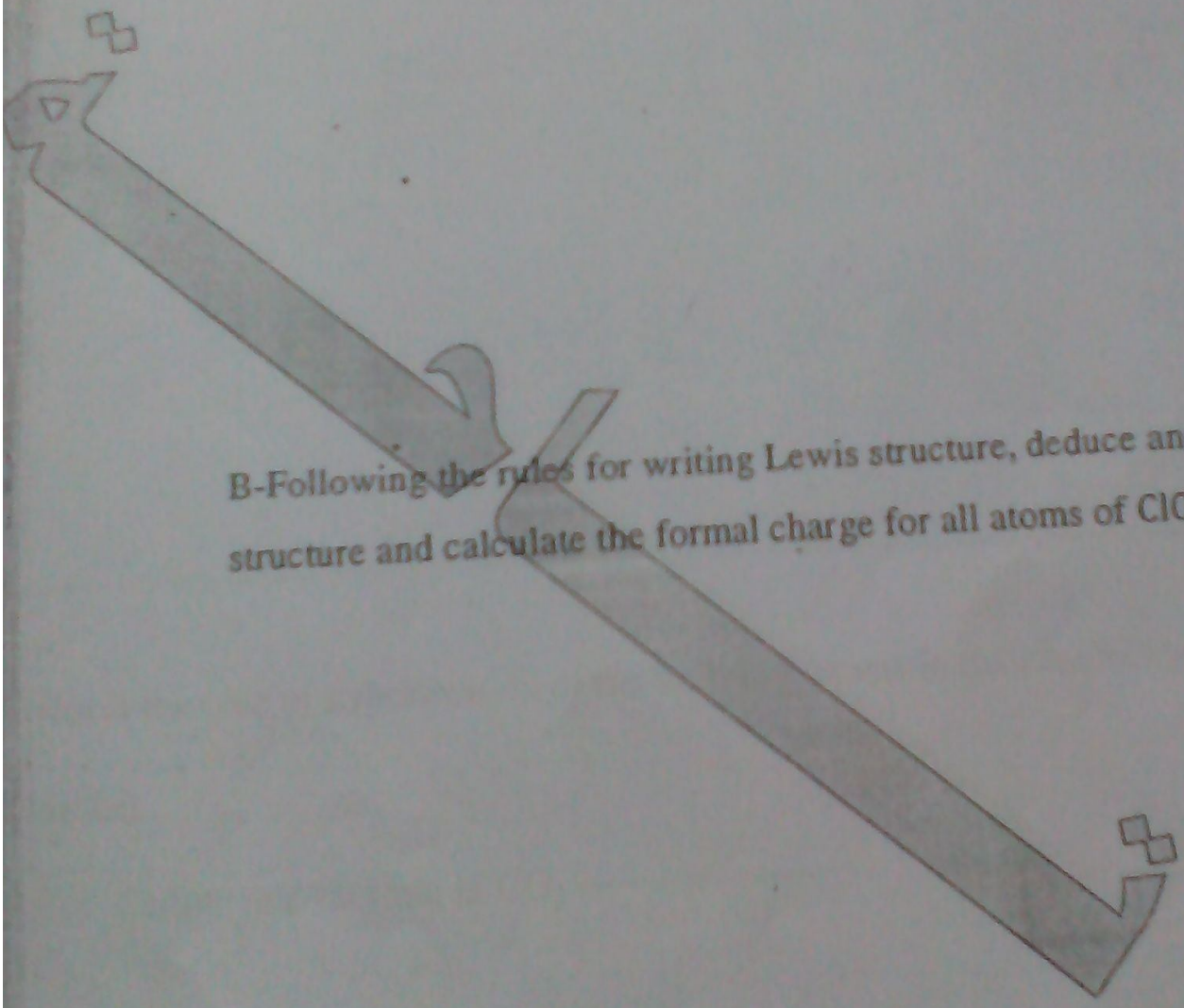
Q2: A Calculate the wavelength of the spectral line emitted from H-atom o electron transition from n= 5 to n=2($R_H = 2.18 \times 10^{-18}$, h= 6.62×10^{-34} JHs). (6 Marks)



B-Following the rules for writing Lewis structure, deduce and draw the Lew structure and calculate the formal charge for all atoms of ClO_3^-. (6 Marks)

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Q5: A-Use VSEPR theory to predict the overall geometry and shape of the following molecules. (6 Marks)

Molecule	Overall geometry	Shape
$BeCl_2$		
BF_3		
CH_4		
PCl_5		
SF_6		

B- What is the type of hybridization of the indicated atoms in their molecules .

(3 Marks).

i) Carbon and Oxygen in CO_2 ----------

ii) Phosphorus and chlorine in PCl_5----------

iii) Sulfur and fluorine in SF_6----------

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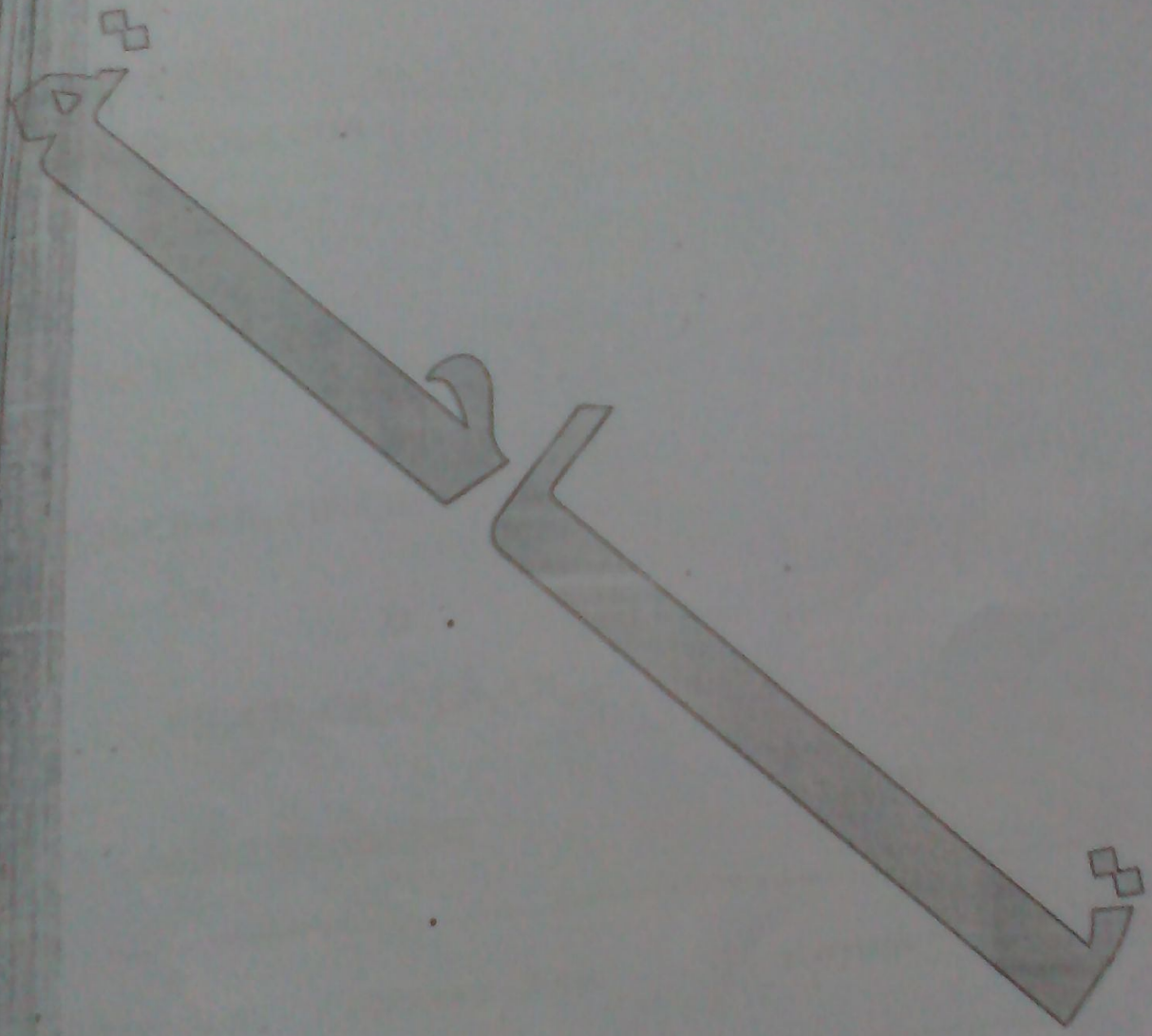
C- Write the resonance structures of SO_3, O_3 and SO_2 (3 Marks



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Question Four:

A. Write the IUPAC name for each of the following compounds: (8 marks)

Structure	Name
1. $CH_3-CH(CH_3)-CH(CH_3)-CH_2-CH_3$	
2. $CH_3-CH(OH)-CH_2-CH_3$	
3. $CH_3-C\equiv C-CH_3$	
4. $CH_3-CH_2-CH_2-COOH$	
5. $CH_3-CH(CH_3)-CH_2-Cl$	
6. $CH_3-CH(CH_3)-CH_2-CHO$	
7. $CH_3-CH(CH_3)-CH_2-CH=CH_2$	
8. $CH_3-CH_2-CH_2-CH_2-C(=O)-CH_2-CH_3$	

B. Complete the equations: (4 marks)

1. ..... → ..... → ..... → benzene

Ethane dibromo ethane acetylene

2. $CH_3-CH_2-CH(Br)-CH_3 + alc.KOH \longrightarrow$ .....

3. $CH_3-CH(Br)-CH(Br)-Br + Zn\ dust \xrightarrow{\Delta}$ .....

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Question Five:

Put (√) or (X) in front of each sentence (12 marks)

1. CH_3-NH-CH_2-CH_3 is called diethylamine. ( )

2. Phthalic acid is dicarboxylic acid. ( )

3. Vic-dihalogens alkanes react with Zn metal to give alkynes. ( )

4. Kolb's electrolysis is used to prepare alkanes, alkenes & alkyenes. ( )

5. When we have two constituents at benzene ring three isomers structures may be present. ( )

6. Benzene is the parent of the aromatic compounds. ( )

7. Dihydric alcohol contains three hydroxyl groups. ( )

8. Carbon atoms are termed tertiary (3ry) if they are linked to three carbon atoms. ( )

9. Functional group isomerism exists in ethyl alcohol and dimethyl ether. ( )

10. IUPAC name of CH_2=CH-CO-CH_3 is 3-butene-2-one. ( )

11. Grignard reagents are obtained by the action of magnesium metal on alkyl halides in dry ether. ( )

12. Hydroquinone is called 1, 3-dihydroxybenzene. ( )

13. The common name of alkane is called normal if its carbon is continous. ( )

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Question Six:

A. Draw the structural formula for each of the following compounds: (9 marks)

Name	Structure
1. butyric acid	
2. benzyl alcohol	
3. n-butyl alcohol	
4. iso-butyl chloride	
5. α-butylene	
6. pentanal	
7. 2-pentyne	
8. methylcyclohexane	
9. 1,3-butadiene	

B. Write one method for the preparation of the following compounds: (3 marks)

1. Methane

2. Polyethylene

3. Acetone

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Department of Chemistry
Faculty of Science – Cairo University

Final Exam for Chem. 101

Date: 23/8/2010 **Time allowed: 2 hrs.**

Answer *five* questions only from these questions

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Cairo university

Faculty of science
Department of chemistry

Final Examination
General Chemistry
Chem. (101)

Answer the Following Questions:

I. put (√) or (X) on front of each sentence: (10 Marks)

1) The order of increasing electron affinity of the following elements is ( )
$F < C < N < Cl$.

2) Ionization energy is the energy required to remove an electron from a gaseous atom or ion. ( )

3) The angular momentum quantum number, (l), describes the orientation of the orbital in space. ( )

4) Pauli exclusion principle states that, any two electrons in an atom can have the same four quantum numbers. ( )

5) The order of increasing electronegativity for the following elements is ( )
$B < N < O < F$.

6) The electron configuration of the following element Z = 29 is [Ar] ( )
$4s^2 3d^9$

7) Bonding atomic radius increases from left to right across a row. ( )

8) Lewis structures are representations of molecules showing all bonding electrons only. ( )

9) The number of waves passing a given point per unit of time is the wavelength. ( )

10) The principal quantum number n, describes the energy level on which the orbital resides. ( )

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2.A Draw the Lewis structure and assign the formal charge of the atoms for each of the following molecules: (6 Marks)

Molecule	Lewis structure	Formal charge
HNO_3		
ClO_3^-		

2.B. For principle quantum level n=5, determine the number of subshells (different values of l) and give the designation of each. (2 Marks)

2.C. Write the resonating structures of SO_3. (2 Marks)

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3.A. On the basis of the VSEPR model complete the following table: (6 Marks)

Molecules	Total number of electron pairs	Number of bonding pairs	Number of lone pairs	Geometry (Name)
H_2O				
BrF_5				
NH_3				
ClF_3				

3.B. What is the type of hybridization of the indicated atoms in their molecules: (4 Marks)

1) Phosphorous in PCl_5

2) Carbon in CH_4

3)oxygen in CO_2

4) sulfur in SF_6

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Question Four

A- Write the IUPAC name for each of the following compounds [8 marks]

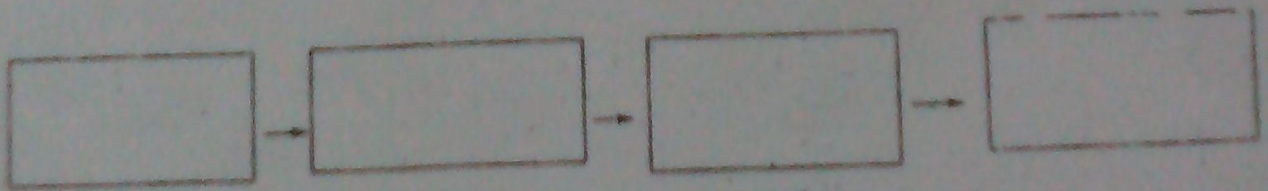
	Structure	Name
1	$CH_3-CH(CH_3)-CH(CH_2CH_3)-CH(CH_3)-CH_2CH_3$	
2	$CH_3-CH(OMe)-CH_2-CH_2-CH_3$	
3	$CH_3-C\equiv C-CH_3$	
4	$CH_3-CH(NH_2)-CH_2-COOH$	
5	$CH_3-CH(CH_3)-CH_2-Cl$	
6	$CH_3-CH(Cl)-CH_2-CHO$	
7	$CH_3-CH(OH)-CH_2-CH=CH_2$	
8	$CH_3-CH_2-CH(CH_2-CH_3)-CH_2-C(=O)-CH_2-CH_3$	

B- Starting from ethene show by chemical equations how you can [4 marks]

Prepare:

Dibromoethane, acetylene and benzene

C- Complete the equations that represent this conversion



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Question Five

A) Draw the structural formula for each of the following compounds [8 marks]

	Name	Streure
1	1,3-butadiene	
2	Benzamide	
3	Methyl ethanoate	
4	Resorcinol	
5	o-chloroaniline	
6	Oxalic acid	
7	β -ethyl-α-butylene	
8	Ethyl cyclohexane	

B- Write one method for preparation each of the following compounds [4 marks]

A) acetylene

B) Hexane

C) 2-Butene

d) Acetone

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